

ART. XIII.—*On the Occurrence of Graptolites in North-Eastern Victoria.*

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[Read 3rd September, 1896.]

Some two years ago Mr. W. H. Ferguson gave me a small collection of graptolites, some of which he had obtained at Wombat Creek near Mount Wills, and the rest near Tungamah. The presence of *Dicranograptidæ* showed at a glance that the rocks belonged to the upper portion of the Ordovician series, but the smallness of the collection and the imperfect nature of many of the specimens caused me to lay them aside in the hope that a larger and better series would be forthcoming. Mr. Ferguson has not, however, had an opportunity of re-visiting the localities, but during an examination of the country in the north-east of the county of Benambra he was fortunate enough to find a fresh fossiliferous locality on the banks of Walwal Creek. The specimens which he found on this last occasion were placed at my disposal, through the courtesy of Mr. J. Travis, the Acting-Secretary for Mines, with the request that I would identify the specimens. I wrote a short report which was handed in to the Department, but its publication is delayed for the present.

Wombat Creek.

The locality from which the specimens were obtained is well within the area shown as metamorphic on the present geological map of the colony. Most of the specimens are a mere glaze on the surface of the rock, and are quite invisible except when held in a certain position with regard to the light. The two species identified, however, are sufficiently well preserved to enable enlarged drawings to be made under the camera. These are *Dicellograptus elegans*, Carr., and *Climacograptus bicornis*, J. Hall. Besides these there are two, or perhaps three, species of *Diplo-*

graptide, the characters of which are too obscure to permit of identification.

Tungamah.

No older rocks are mapped in the locality from which these specimens came. They are more conspicuous than those from the former locality, but the finer characters are in great part obscured through weathering. There are several which appear to be new, one perhaps generically, but they are too obscure to speak of with any definiteness. I query some of the species, as they are identified from the form and dimensions of the polypary only, the hydrothecæ not being visible. The following forms occur: ? *Dicellograptus sextans*, J. Hall; *Dicellograptus* sp.; ? *Dicranograptus ramosus*, J. Hall; *Diplograptus pristis*, Hisinger, and *Glossograptus*, sp.

Walwal Creek.

The district from which these specimens come is coloured as granite on the map. They are preserved merely as a glaze on the rock and, though unable to make camera drawings of them, I made careful sketches and measurements of those I have identified. Several forms of *Diplograptide* were too badly preserved to speak of definitely, but I have made out the characters of the following: *Dicellograptus anceps*, Nich.; *Diplograptus pristis*, His.; *Diplograptus truncatus*, Lapw.; *Climacograptus bicornis*, J. Hall.

It has of course long been known that the boundaries of the geological formations as laid down on the present Victorian map needed revision, especially in the area under notice, and the compilation of a new map by Mr. Arthur Everett from recent surveys is practically completed.

The age of the Lower Palæozoic rocks of North-eastern Victoria has, in the absence of fossils, been a matter of considerable doubt. Mr. A. W. Howitt in his earlier papers considered the balance of evidence in favour of Lower Silurian (Ordovician). The rocks show, according to Mr. Howitt, great structural and lithological resemblances to those to the east of the Snowy River, and from

this latter area he quotes, on the authority of Sir Frederick McCoy, *Diplograptus rectangularis*, McCoy, from Deddick; *Diplograptus foliaceus*, Murch., and *Didymograptus caduceus*, Salter from Guttamurrli Creek.* From the Gibbo River he quotes *Palæopora* sp., from the limestones and states that Sir Frederick McCoy regards this form to be indicative of the Upper Silurian age of the limestone. In a later paper† the same author, in speaking of the slates and sandstones of the Upper Dargo, says that they "have hitherto been provisionally regarded as Lower Silurian, but may possibly be found ultimately to be Cambrian." Although, from the nature of the case, Mr. Howitt speaks guardedly of the age of the strata, he has shown that part, at any rate, of the metamorphic schists are representatives of the unaltered sediments.‡

The three localities which have yielded the graptolites treated of in this paper are widely separated, but are, as far as can be judged, of nearly the same age, and may be referred to the higher part of the Ordovician. Till more evidence be available it would be rash to push the analogy to the succession in British rocks any further.

As far as I am aware there are no published records of any (Upper) Silurian fossils, other than the *Palæopora* referred to by Mr. Howitt, having been found in the area under consideration. Mr. Ferguson, however, informs me that he has a large suite of fossils from Wombat Creek which he considers to be (Upper) Silurian. The publication of his report will be looked for with interest.

It is of course possible that, in such a wide area as the one treated of, rocks older than these may occur, but of their occurrence we have no evidence whatever. Mr. A. W. Howitt in his long series of papers on the rocks of Eastern Victoria has shown that a gradual passage takes place from the unaltered rocks into the crystalline schists, and this fact taken in conjunction with the evidence here brought forward as to the geological age of the

* Progress Report, Geol. Survey of Victoria, vol. iii., p. 186.

† "Notes on the Contact of the Metamorphic and Sedimentary Formations of the Upper Dargo River." Department of Mines, Special Reports, 1892, p. 3.

‡ Aust. Ass. for Adv. Science, vol. i., Sydney, p. 206.

unaltered sediments gives us sufficient grounds for considering the metamorphic rocks of North-eastern Victoria to be not older than Ordovician.

My thanks are due to Sir Frederick McCoy for allowing me access to several papers on graptolites, which are not to be found in any of our Victorian libraries; and also to Mr. W. H. Ferguson of the Geological Branch of the Mines Department, who collected the fossils I have examined.

ART. XIV.—*A Contribution to our Knowledge of the Tertiaries in the Neighbourhood of Melbourne.*

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AND

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(Plate VIII.)

(Read 10th September, 1896).

Numerous scattered references have been made to the Melbourne Tertiaries in our Geological Literature, but hitherto no attempt has been made to describe them in any detail in the light of the more recent palæontological work that has been published. The lithological character of the sedimentary rocks of the period, consisting as they do, for the most part, of ferruginous sands and gravels, is not suited to the good preservation of fossils which are represented as a rule by casts, and to a lesser extent by usually very friable remains of the fossils themselves. As we have been collecting material and studying the beds in all parts of the area for some years, we feel that we are now in a position to make some substantial additions to the knowledge of the series and to clear away some misconceptions which prevail in reference to their age.

HISTORICAL.

We mention in chronological order the more important references to the deposits and the titles of a few additional papers will be found in the Literature at the end of the present article.

In 1855 Mr. A. R. C. Selwyn, (1) under the head of Tertiary, described the lithological character of the beds, indicating four divisions. He says that the blue clays with limestone bands appear to be the lowest portion of the tertiary series exposed in